

The **FLOOD-CBA 2** project is an initiative funded by the Directorate General Humanitarian Aid and Civil Protection (DG-ECHO) of the European Union. It aims at integrating Cost-Benefit Analysis into the decision making process for selecting the appropriate and most efficient **Flood Protection Standards** in flood prone areas.

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Integrating Cost-Benefit Analysis in the Development of Standards for Flood Protection & Safety



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Humanitarian Aid & Civil Protection (ECHO)



FLOOD CBA 2 project has been built on the experience gained from the delivery of FLOOD CBA in the framework of Civil Protection Financial Instrument of DG ECHO.

FLOOD CBA has successfully established a Knowledge Platform for the use of stakeholders dealing with the Cost-Benefit Analysis of flood prevention measures. **FLOOD CBA 2** project goes beyond this and integrates CBA into the decision making process for selecting the appropriate **Protection Standards** in flood prone areas.

Flood protection standards are a key factor of flood management plans since they specify the protection offered to a certain area from flooding. EU member states present a diversity of methods regarding the development of flood protection standards ranging from fixed design standards to economics-based approaches, or even to investments based on local imperatives often at the expense of efficiency.

At the time when policy makers are seeking to reduce expenditure and obtain better value for money, that efficiency should be raised as of paramount concern. **FLOOD CBA 2** attempted to address this challenge by proposing an EU transnational cooperation that worked on the:

- i) review and analysis of the available frameworks, methodologies and tools;
- ii) provision of a common state of the art guidance, data sources and support structures for the development of standards;
- iii) implementation of real case studies on how to evaluate alternatives of standards based on the Cost Benefit Analysis and training on the case studies methodology and results.

The results of the four case studies of the project are presented here in brief:

Oxford

The city of Oxford sits at the confluence of the River Thames and the Cherwell, and has been affected by floods over many years. The main areas inundated are residential areas to the south of the city and an industrial and commercial complex at the edge of the city towards the West. A project has been proposed over many years to construct a bypass channel taking flood waters from the west of the city and discharging them downstream of locks and weir structures several kilometres to the south.

The analysis undertaken for **FLOOD CBA 2** comprise a number of minor interventions protecting individual groups of properties as well as the bypass channel described above. Benefit:cost ratios here are much lower than in the other three case studies, probably because the River Thames is a regulated river and has a number of interventions implemented in the past reducing current levels of flood risk. The preferred option of the bypass channel was shown to be economically efficient in terms of its benefit cost ratio (1:9.8) and the relevant incremental benefit cost ratio (1:1.9).

Ecija

The town of Ecija sits on a wide flat floodplain and has experienced serious flooding in the past, inundating important residential areas located near the river. This case study re-examined interventions that have been implemented in the past, including the cutting of a meander loop to expedite flood flows discharging northwards from the town. Other interventions evaluated include raising river walls and making storage available on the floodplain to hold back flood waters. A further intervention analysed the possible construction of the dam upstream from the town, which would reduce flood flows but also provide other benefits.

The economic analysis undertaken for **FLOOD CBA 2** showed that the more ambitious intervention in the way of the dam was not as worthwhile economically in relation to other more modest interventions. The highest benefit: cost ratio was reserved for intervention which improved dikes and embankment to the south of the, where the benefit: cost ratio exceeded 1:40. This analysis had been achieved with minute detail in the assessment of the properties at risk, and comprehensive modelling of the effect of different return periods on the extent of flooding in the town.

Lavara

The town of Lavara sits on the edge of the floodplain of the Evros, Greece, with that floodplain being used primarily for agricultural production. The town has experienced flooding in the past, and future floods are likely to increase in severity owing to climate change. The area affected by flooding in the town is largely residential, with small shops and other commercial premises also at risk.

The analysis undertaken in the **FLOOD CBA 2** project suggests three possible levels of intervention. First, blocking the arches under the proposed new road would prevent flood waters entering the town. Secondly, increasing the conveyance of the mid-floodplain drainage channel would alleviate flooding to some of the agricultural land at risk. Thirdly enhancing the embankment along the river on the Greek side would prevent virtually all flooding of the floodplain and the town. The analysis undertaken of the economics of each intervention shows that the first, above, is by far the preferred level of investment, with high benefit: cost ratios (>1:250). The incremental benefit:cost ratios for more ambitious interventions are largely below 1.0, indicating the lack of an economic case for proceeding beyond the first intervention listed above.

Amadora

The city of Amadora is adjacent to Lisbon and is a densely occupied urban area with a topography that contains areas of steep slopes and very little open space, particularly towards the bottom of a catchment. The area suffers from urban flash flooding, as does the capital, Lisbon, and the main Amadora areas affected by this flooding are residential areas comprising blocks of apartments.

The analysis undertaken for **FLOOD CBA 2** shows that investment in flood risk management would be economically very efficient, with high ratios of benefits to costs. Cleaning the urban infrastructures and river banks to increase flood flows results in a benefit: cost ratio of over 1:15. More ambitious projects are still worthwhile economically, with rehabilitating the river channel achieving an incremental benefit-cost ratio of over 4.20. These high ratios can be attributed to the severity of the flash flooding combined with a densely occupied urban spaces.